

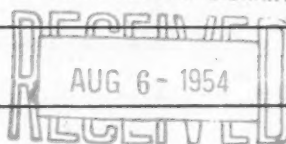
510. 272

COMPUTERS AND AUTOMATION

CYBERNETICS • ROBOTS • AUTOMATIC CONTROL

Vol. 2, No. 5

THE JOHN CRERAR LIBRARY



July, 1953

Machine Translation

... Yehoshua Bar-Hillel

Robot Traffic Policemen

... George A.W. Boehm

How to Talk About Computers

... Rudolf Flesch

Published monthly except June and August by
Edmund C. Berkeley and Associates, 36 West 11 St., New York 11, N.Y.

THE EDITOR'S OFFICE

Roster of Organizations. For some time we have not been entirely satisfied about the basis for inclusion of organizations in the "Roster of Organizations in the Field of Computers and Automation". It is reasonable enough to include organizations making whole computers and systems, but we have had to draw rather a nebulous line between organizations making some components and organizations making other components.

Accordingly, beginning in the September issue we shall commence a second listing of organizations, a "Roster of Organizations Making Components". Since this would be a very large list if we included all organizations making motors, resistors, condensers, etc., we have decided that this roster will be a paid-for instead of a free listing. The rate will be \$3 a line with a minimum of four lines; if a company making components advertises in the same issue, it will receive free a four-line listing. The listing will be subject to the customary editing for completeness and objectivity.

Patents. In the March issue, we published the request of Ray W. Boyer, Dayton, Ohio, for regular information on patents related to computing machinery. Hans Schroeder of Milwaukee, Wisc., has volunteered to prepare regularly a summary of patents related to computers and automation. The first instalment of his summary appears in this issue; and it is expected that the summary will be published from time to time.

Reference Information. These changes will bring to seven the number of kinds of reference information so far published from time to time in COMPUTERS AND AUTOMATION: Roster of Organizations in the Field of Computers and Automation; Roster of Organizations Making Components; Who's Who; List of Automatic Computers; Glossary; Books and Other Publications; Patents.

Notice. COMPUTERS AND AUTOMATION is published ten times a year, monthly except June and August, by Edmund C. Berkeley and Associates, 36 West 11 St., New York 11, N.Y. Copyright, 1953, by Edmund Callis Berkeley. Subscription rates, \$4.50 for one year, \$8.50 for two years, in the United States and Canada; \$5.50 for one year, \$10.50 for two years elsewhere. Entered as second class matter at the Post Office, New York, N. Y.

Address Changes. If your address changes, please notify us giving both old and new addresses, and allow three weeks for the change.

Back Copies. Issues October, 1952, to date are available. Price \$1.25 each -- or a subscription may be specified to begin with a stated issue. See more information on page 28.

Manuscripts. For information about manuscripts wanted (and paid for), see the note on page 16.

COMPUTERS AND AUTOMATION

Vol. 2, No. 5

July, 1953

ARTICLES

Page

Machine Translation	1
by Yehoshua Bar-Hillel	
Robot Traffic Policemen	7
by George A. W. Boehm	
How to Talk About Computers	17
by Rudolf Flesch	

REFERENCE INFORMATION

Roster of Organizations (supplement)	11
Books and Other Publications	14
Patents	21
Who's Who: Section 3 -- Not Programming, Not Business (cumulative, E to K)	22

DEPARTMENTS

The Editor's Office	i
Forum	19
Advertising	33

Editor: Edmund C. Berkeley

Advisory Committee: Samuel B. Williams,
Herbert F. Mitchell, Jr.

Assistant Editors: Eugene F. Murphy,
Neil Macdonald, Hans Schroeder

Illustrator: John W Parker

Contributing Editors: George A. W. Boehm, James Gibbons, Grace M. Hopper, Alton S.
Householder, Henry M. Paynter, Jr., Fletcher Pratt

Publisher: Edmund C. Berkeley and Associates

MACHINE TRANSLATION

by Yehoshua Bar-Hillel

Research Laboratory of Electronics, Mass. Institute of Technology, Cambridge, Mass.

(The work reported in this article has been supported in part by the Signal Corps, the Air Materiel Command, and the Office of Naval Research, and in part by the Rockefeller Foundation.)

More than a year ago, I wrote a paper entitled "The Present State of Research on Mechanical Translation", which was published in "American Documentation" (see reference 8 below). Few engineers perhaps are likely to consult the journal in which it was published, and additional advances have been made during 1952 and the first months of 1953, both in theory and in organization. Therefore it may be worthwhile to present here a summary of my earlier paper and to indicate some of these advances.

Among the noncomputational applications of high-speed digital computers, facilitation of translation from one language into another was considered relatively early. Indeed, a number of the operations that are performed during a complete translation process are routine operations, or are at least replaceable without loss by routine operations. Besides, there is a severe shortage of bilingual persons who can translate scientific material accurately and who can scan at high-speed the printed output of actual or potential enemies. This shortage has served as a potent incentive for research into the possibilities of total or partial replacement of human beings by automata in translation of languages.

Let me describe here somewhat dogmatically, for lack of space, the present outlook. Fully automatic high-accuracy translation seems out of the question in the near future. If this aim were achieved, it would require either storage capacities of trillions of bits of information, or the invention of programming techniques that could greatly increase the machine's efficiency by learning, or some combination of these two factors. At any rate, we would need something that would resemble a human being in versatility much more than automata will be able to do in the reasonably near future. Therefore, either the high accuracy or the complete automatic character of the translation process must be sacrificed.

Whenever high accuracy is essential, as is the case generally in translation of scientific material -- and I mean here translation proper and not merely scanning for worthwhileness of careful translation --, only man-machine partnerships are at present in view. These may still be of quite diverse characters. One combination is known as "machine plus post-editor", where the post-editor takes the machine's first approximation and knits it together. A second combination is known as "pre-editor plus machine"; here the pre-editor rearranges the foreign text into a natural form for the language into which it is to be translated. A third combination is "machine plus bilingual editor" (whose time of employment will, of course, be highly restricted so as not to trivialize this kind of partnership). These combinations have already been explored to some extent.

Each of these partnerships offers its special advantages and hardships. It seems that a post-editor would be at his best in eliminating semantic ambiguities; a pre-editor would conceivably excel in rephrasing to avoid grammatical ambiguities and in indicating "idiomatic" expressions; and a bilingual editor might be profitably employed to deal with stubborn "remainders".

The partnership of machine plus post-editor seems to me of special theoretical interest. It appears, incidentally, that this might also be the most helpful practical combination. For example, there is no shortage of expert English-speaking chemists, but there are not enough of them who also know, say, Russian to a sufficiently high degree.

What, then, could a machine do to aid the post-editor in producing a satisfactory counterpart of, for example, a certain German paper? (I assume that we shall soon have mechanisms that will be able to "read" printed material.) The device that comes immediately to mind would then be a mechanical dictionary, that is, an apparatus which correlates to the coded version of each German word the coded version of one or more English words or phrases, or combinations of such with what we might call operators. A word, in this context, means anything that appears between spaces, or between a space and a period, and the like, that is, something identifiable by its shape alone.

The decoded form of an entry in such a dictionary might look like this: "lieben — (1) love, (2) to love, (3) dear"; or, alternatively, "lieben — (1) love (inf.), (2) love (pres., plur., 1st or 3rd person), (3) dear (plural), (4) dear (sing., gen. or dat. or acc.-masc.)" with the "operator" in parentheses.

This type of system would require a storage of between one and two million entries and their correlates, hence of hundreds of millions of bits under ordinary alphabetical coding. Since the access-time has to be, for practical reasons, of the order of tenths of seconds at most, the preparation of a mechanical memory adequate for this task presents a serious, though certainly not insurmountable, engineering problem. I shall not discuss here how coding skill and intelligent organization of the dictionary could reduce both storage capacity and access-time (but see reference 7).

Experimentation carried out by different groups (ref. 5a, 6, 7) seems to indicate that, for translation from Russian into English, from German into English, and from some other Indo-European languages into English, the output of the mechanical dictionary, at best arranged in columnar form, is often sufficiently intelligible to the expert post-editor so that he can write down almost immediately a unique (up to the point of synonyms) translation of the unknown original. The following is an example of a simplified hypothetical output of a German-English mechanical dictionary, consisting of what the machine would conceivably present to the post-editor as its first approximation in English to a given German sentence. The reader would do well to scan the alternatives and then write down for himself what he prefers as the translation of the unknown German sentence, before he consults the German original stated at the end of this article.

the	answer	on	this	question
which (rel.)	reply	(any preposition)	this one	problem
who (rel.)			the latter	demand
				inquiry

hang (pres., 3rd, sing.)	both	at the
hang (pres., 2nd, plur.)	as well	(any preposition) the
depend (pres., 3rd, sing.)		
depend (pres., 2nd, plur.)		

optical microscope	as	also	at the
	since		(any preposition) the
	when		
	than		

electron microscope

from
(any preposition)

three

different
differing
unlike
various
deceasedproperty (plur.)
quality (plur.)
attribute (plur.)
character (plur.)
nature (plur.)
condition (plur.)

of the

microscope

from
upon
(preposition or
separable prefix)

The reader will have noticed, to his annoyance, the occurrence of one of the most disturbing features of German construction, the separable prefix. He will also have noticed the special difficulties involved in the translation of prepositions. I anticipate, nevertheless, that the translation with which most readers will wind up will not be far off the point, in spite of the fact that they have to choose between some 50,000 combinations (disregarding the choice of the prepositions which, if taken into account, would have increased this number to many millions). However, the given sentence is only of average complexity or less. Translation in this fashion of complex sixty-or seventy-word sentences—which are not too infrequent in German scientific writing—would have presented much greater troubles. It might turn out that the load on the post-editor would be too great for any practical purposes.

Could not something more perhaps be done by the machine? Could it not eliminate grammatical ambiguities—such as in the first column, where only the definite article is acceptable, or in the sixth column, where only the 3rd person fits? Could it not rearrange the words into some standard English word-order—such as the rearrangement of "hängt... ab" into "abhängt"? I think this is definitely possible, but only after much linguistic spadework of a type to which linguists have not been accustomed so far. Elsewhere (ref. 9) I have attempted to give the outlines of such a new approach to linguistic analysis. At another place (ref. 8), I exhibited an output of a hypothetical "mechanical analyzer plus rearranger plus dictionary" which was tested on a small scale and shown to be fairly satisfactory. At still another place (ref. 10), I discussed other aspects of this problem, as well as some methods of dealing mechanically with idioms.

Lack of space prevents us from going into further details here of research done so far on machine translation. The attached annotated bibliography should, however, enable the interested reader to get more of the necessary information.

Let me conclude my outline by mentioning the Conference on Machine Translation. This conference met in June 1952 at Massachusetts Institute of Technology under a grant from the Rockefeller Foundation. Almost everyone who is actively engaged in research on machine translation participated at this conference, and also many others whose interest until then was more academic. This conference provided the participants with much stimulation and actually induced some outsiders to take up research in this field. It was the consensus of all participants that machine translation shows definite possibilities. Various projects are now under way but none, to my knowledge, is being undertaken on a scale that would ensure rapid progress. However, I am convinced that within a decade, at most, substantial achievements toward machine translation will have been made. It is tempting to speculate about the sociological feedbacks of this development, but I prefer to remain, for this account, within the limits of factual sobriety.

Here is the German sentence whose hypothetical correlates through a mechanized dictionary were presented above:

"Die Antwort auf diese Frage hängt sowohl beim Lichtmikroskop als auch beim Elektronenmikroskop von drei verschiedenen Eigenschaften des Mikroskops ab."

Bibliography

1. Warren Weaver, Translation, mimeographed, 12 pages, July 15, 1949. — This memorandum contains an account of the early history of machine translation and comprises, among other things, an interesting exchange of letters between Weaver and Norbert Wiener in 1948; Wiener was on the skeptical side. Weaver also mentions a memorandum by A. D. Booth, now Director of the Computation Laboratory in Birkbeck College, University of London, dated February 12, 1948, in which translation with the help of a mechanized dictionary is considered. Weaver, however, was apparently the first to consider machine intervention going beyond a mechanized dictionary. Though Weaver's contribution was admittedly of a rather speculative nature, it gave, no doubt, the major impetus for subsequent research on machine translation in the United States.

2. Abraham Kaplan, An Experimental Study of Ambiguity and Context, the RAND Corporation, P-187, 18 pages, Santa Monica, November 30, 1950. — This monograph is an outcome of a study undertaken at RAND with a view to rapid mass translation. Though of only direct interest to machine translation proper, its contents give a possible theoretical background for the explanation of the speed and efficiency with which a post-editor can select a good translation out of millions of candidates.

3. Victor A. Oswald, Jr., and Stuart L. Fletcher, Jr., Proposals for the Mechanical Resolution of German Syntax Patterns, Modern Language Forum, 36: 1-24, 1951. — This paper shows how certain syntactically ambiguous word sequences can be mechanically uniquely resolved. Though admittedly only a first attempt, it contains many nuclei for a more systematic attack.

4. Erwin Reifler, Studies in Mechanical Translation, mimeographed, 1951-53. — The author embarked, under the influence of Weaver's memorandum, upon many ingenious studies dedicated to machine translation. Thus far he has published eight studies in mimeographed form and has many more in preparation. He is also preparing a revised version of these studies for publication in printed form.

His ideas are too manifold to be summarized here. Let it be said only that in his first studies he dealt mainly with the problems of pre-editor plus machine partnership, but he has now shifted his attention to the machine plus post-editor combination with a minimization of the latter's participation in view. Insufficient acquaintance with the working of digital computers reduces somewhat, though by no means nullifies, the impact of his studies on immediate applications.

5. Conference on Mechanical Translation, M.I.T., June 17 - June 20, 1952. The Proceedings of this conference are due to appear eventually. Only a few of the papers submitted in mimeographed form are summarized and evaluated here.

a. R. H. Richens and A. D. Booth, Some Methods of Mechanized Translation, 31 pages — The authors are the main adherents of the thesis that a mechanized dictionary, supplemented by a limited amount of mechanized grammatical analysis, mainly suffix analysis, is in general a sufficient basis for subsequent post-editing. The thesis is

illustrated by translation specimens involving some twenty languages. Schedules for punch-card and electronic machines are outlined.

In my opinion, the general redundancy of syntactical analysis prior to word-by-word translation has not been sufficiently substantiated by the authors.

b. Victor A. Oswald, *Word-by-Word Translation*, 8 pages. — Oswald, in direct opposition to Richens-Booth, tries to show that word-by-word translation will not, in general, yield intelligible outputs. It seems, however, that this evaluation is too pessimistic, just as the one given by Richens-Booth was too optimistic. Obviously, much more extensive experimentation is required to settle this question.

c. Victor A. Oswald, *Microsemantics*, 10 pages. — As a partial aid in reducing the overload of correlates presented by straightforward word-by-word translation, Oswald proposes the construction of special glossaries, since many words, which are highly ambiguous in general, lose much of their ambiguity when it is known that they are used in a study belonging to a certain restricted field.

d. Charles S. Dodd, *Model English for Mechanical Translation*, 9 pages. — The author foresees the impact of regularizing, prior to translation, any or both of the languages involved in mechanical translation. He expounds in detail a method of "modelizing" English which would highly increase its grammatical regularity and thereby reduce the machine effort of finding out the grammatical structure of a given sentence.

e. Other participants dealt with Operational Syntax, Treatment of Idioms, Mechanical Translation of Printed and Spoken Material, Frequency Problems in Mechanical Translation, Teaching of Foreign Languages, Basic Machine Operations in Mechanical Translation, Problems of Storage and Cost.

6. James W. Perry, *Memoranda on Mechanical Translation*, mimeographed, 1952-53. — In the five memoranda prepared so far, the author discusses mainly the various possible designs of mechanical dictionaries and the impact of grammatical indicators on the intelligibility of the machine output. One of his results states that omission of some grammatical information does not seriously reduce the intelligibility of a word-by-word translation from Russian into English, in corroboration of the Richens-Booth thesis.

7. A. G. Oettinger, *A Study for the Design of an Automatic Dictionary*, Progress Report No. 26, Computation Laboratory, Harvard University, February 10, 1953. — The author, who is working on a Ph.D. thesis on machine translation, independently discusses problems similar to those treated by Perry but he gives special attention to coding.

8. Y. Bar-Hillel, *The Present State of Research on Mechanical Translation*, American Documentation 2:229-237, 1951 (appeared 1953). — This report was prepared in January 1952 and widely circulated in mimeographed form. It contains the first synopsis of the various approaches to machine translation.

9. Y. Bar-Hillel, *A Quasi-Arithmetical Notation for Syntactic Description*, Language, 29:47-58, 1953. — A method is described whereby syntactical analysis of any given sentence is possible if a complete list of the syntactic categories to which all words of the given language may belong is prepared.

10. Y. Bar-Hillel, Some Linguistic Problems Connected with Machine Translation, Philosophy of Science, 1953. — The problems of the need for an operational syntax, of the treatment of idioms in machine translation, of the intertranslatability of all natural languages, and of the existence of a universal scheme of syntactic categories are discussed.

11. Kenneth E. Harper, The Mechanical Translation of Russian: A Preliminary Report, University of California, Los Angeles, 26 pages, 1953. — The author shows convincingly that machine translation of scientific Russian, on the basis of an idioglossary and suffix analysis, is satisfactory and immediately feasible. "It appears that a Russian vocabulary of some 3000 words would be adequate for the translation of mathematical papers."

12. Victor A. Oswald, Jr., and Richard H. Lawson, An Idioglossary for Mechanical Translation, University of California, Los Angeles, 16 pages, 1953. — The authors prove experimentally that an idioglossary of less than 5000 entries; suffix analysis, and a restricted syntactic analysis form a sufficient background for effective mechanical translation of German papers dealing with brain surgery. The statement, however, that "the major linguistic problems of pragmatic mechanical translation can now be regarded as solved" is not completely borne out by the presented facts.

In this bibliography only material prepared with machine translation as its main object is considered. Some other relevant publications are mentioned in the bibliography of reference 8.

ROBOT TRAFFIC POLICEMEN

by George A. W. Boehm
Science Editor, Newsweek

To many a motorist the typical traffic signal seems imbued with the spirit of the French at Verdun -- "They shall not pass." As he approaches a lonely intersection, the light turns red in his face. He must stop and wait for the green light, while perhaps no traffic at all crosses his path.

In the summer of 1927, Henry A. Haugh, Jr., an electrical engineering instructor at Yale and an indignant motorist, set about to rectify the blind stubbornness of the steady-cycle traffic signal. The system which he devised and its descendants are now in use at hundreds of crossroads in the United States, particularly where village streets intersect busy highways. His system is a mechanism which applies feedback, and through which traffic regulates its own flow by governing the traffic lights.

A Simple Robot Cop

For example, in the case of the busy highway and the village street which crosses it, Haugh's system is based on two principles: that the highway needs a steady green light to accommodate its heavy flow of vehicles; but that the motorist on the cross street deserves a chance to go across without undue delay.

To apply these principles, a small robot controls the traffic lights at the intersection. The robot's main sensory organ is a treadle sunk in the cross-street 50 feet or more from the intersection. When a car approaches the intersection it trips the treadle. This relays a demand for a green light to the robot's thinking organ, a control box usually mounted on a lamppost. By the time the car has reached the intersection, the robot's acting organ, the traffic light, has changed from red to green, and the car can cross without even pausing to change gears. A few seconds later, the light changes back and highway traffic resumes its flow.

If two or more cars in close succession approach the intersection along the village street, the repeated trips of the treadle will hold the green light for a few seconds longer. But the robot traffic controller makes sure that the highway flow is not halted too frequently or too long. This it accomplishes by allocating the cross street traffic not more than about one green light any two-minute interval, say, and by holding it for not more than about 20 seconds, say, regardless of the number of cars that are trying to cross the highway.

Of course, for more complicated control, treadles can be installed also in the highway to enable the robot to respond also to the density of traffic along the highway; etc.

The Volume-Density Traffic Controller

Haugh and his robot traffic policeman joined the Automatic Signal Corp. in Norwalk, Conn., now Automatic Signal Division of Eastern Industries, Inc. In the late thirties two of his fellow engineers there, Harry A. Wilcox and John L. Barker, elaborated on his inventions and created the so-called volume-density control. This improved device is capable of directing traffic at very complicated intersections.

The volume-density traffic controller uses detector treadles in all approaches to the intersection. With multi-position switches it keeps count of the number of cars in each converging traffic stream. It attempts to do what a good human traffic policeman would do: give the right of way to the most congested traffic stream without, however, making any car wait too long for a green light.

Pedestrians too can be taken care of. The pedestrian pushes a button on a lamppost at the cross-walk. The robot traffic cop accordingly senses that a pedestrian is waiting, and responds at the next change of lights by displaying an all-red or all-yellow signal, and thus halting all traffic for a few seconds, for pedestrians to cross.

Different traffic controllers vary considerably, depending largely on the complexity of the intersection which is to be policed. Some of the traffic factors which can be recognized in the robot traffic controller are:

- (1) Minimum Length of Green Light. If more than a certain number of cars are waiting in any stream, each additional car extends the forthcoming green light by a few seconds.
- (2) Maximum Length of Red Light. If waiting cars start to accumulate, each additional car shortens the waiting period.
- (3) Maximum Length of Green Light. No matter how crowded any stream of traffic may be, a motorist waiting on a conflicting stream gets a chance to pass through the intersection after a stated time.
- (4) Platoon Factor. A dense stream of cars rolling through a green light tends to hold the green. But as the stream thins, the light changes and cuts off stragglers.
- (5) Carryover Factor. When two or more volume-density traffic controls are lined up along a street, they can be associated so as to give a car a good chance of passing through the entire string of controls without encountering more than one red light.
- (6) Number of Cars Waiting. By varying the length of the distance of the treadle from the intersection — from 50 feet to 250 feet —, the traffic controller can take into account the number of cars waiting for the next green light.

Within the last year, General Electric, Lynn, Mass., and the Eagle Signal Corp., New York, have begun to compete with the Automatic Signal Corporation in the manufacture of volume-density traffic controllers. The patent situation is not beyond dispute, and the companies are saying remarkably little.

Detroit, White Plains, Louisville, ...

In many places volume-density traffic controllers have proved their ability to handle the flow of traffic at intersections where up to six or even eight streams of traffic converge.

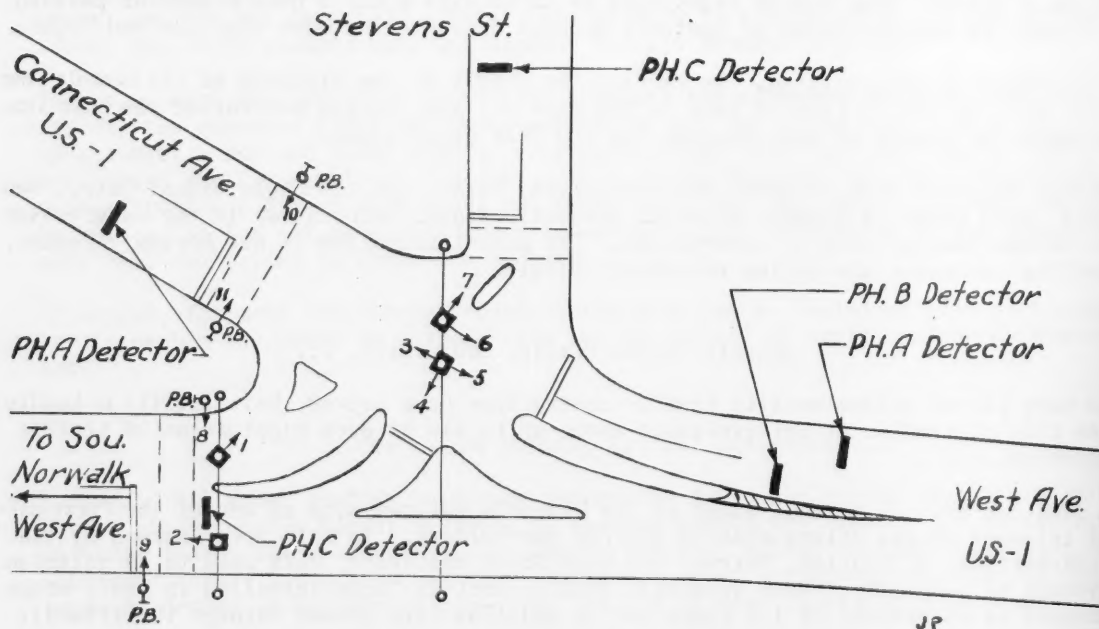
A downtown area in Detroit known as The Triangle was the site of one of the first major triumphs of the volume-density traffic controllers. In this area, formed by the intersections of Gratiot, Warren, and East Grand Boulevard, cars used to be halted an average of 1.6 times. When automatic traffic controls were installed in 1947, stops dropped to an average of 1.0 times and in addition cars passed through the triangle 40 per cent faster.

White Plains, N. Y., had another problem intersection, a traffic circle entered by Main Street, Westchester Avenue, and North Broadway. Despite the presence of two traffic policemen (human variety), congestion was so serious that the city was resigned to building a \$2,000,000 underpass. Last September, White Plains, however, took a chance on a system of volume-density traffic controllers, complete with pedestrian response. Immediately congestion cleared up. One of the human policemen was assigned to other duties, and the other man can leave his post if needed elsewhere. Public Safety Commissioner Frank D. Hanlon estimates that the volume-density controls cost less than \$10,000 more than ordinary steady-cycle lights, which could never have handled the traffic satisfactorily. In addition, by saving a policeman's salary, the automatic controls will pay for themselves in two years, as well as averting the need for the underpass.

Nor is there reason to believe that automatic traffic control need be confined to isolated difficult intersections. The city of Louisville, Ky., has installed almost ninety of the robot traffic cops and plans to put in still more. Mayor Charles P. Farnsley, who has been instrumental in modernizing Louisville's traffic control, remarks that volume-density controls have a strong psychological appeal, beyond their mechanistic efficiency. They keep the motorist happy, he contends, by giving each driver a vote in the control of the traffic signals.

* * *

For a concrete example of a traffic problem, consider the following diagram of an intersection in Norwalk, Conn., which is at present policed by a volume-density traffic controller. It involves U.S. Route 1, a change in direction of Route 1, and the intersection of four traffic streams. In the traffic controller's solution, there are seven motor traffic lights (numbered 1 to 7) and four pedestrian lights (numbered 8 to 11). There are five treadles observing streams of motor traffic, which are clas-



Place
2c
Stamp
Here

Edmund C. Berkeley, Editor
COMPUTERS AND AUTOMATION
36 West 11th Street
New York 11, N. Y.

WHO'S WHO ENTRY AND SUBSCRIPTION ORDER FORM

WHO'S WHO ENTRY

Name (please print).....

Address.....

Organization (& address)?.....

Title?..... Year of Birth?.....

MAIN INTERESTS:	<input type="checkbox"/> Sales	<input type="checkbox"/> Programming
<input type="checkbox"/> Design	<input type="checkbox"/> Electronics	<input type="checkbox"/> Other (specify):
<input type="checkbox"/> Construction	<input type="checkbox"/> Mathematics	
<input type="checkbox"/> Applications	<input type="checkbox"/> Business	

College or last school?.....

Years of experience in computing machinery field?.....

Occupation?..... (Enclose more information about yourself if you wish — it will help in your listing.)

☐ Please send me on approval a copy of the monthly **COMPUTERS AND AUTOMATION**. I will subscribe at \$4.50 a year (U. S., Canada; \$5.50 elsewhere) if I like it. I will return the copy within seven days.

☐ Please renew my subscription. ☐ Payment enclosed. ☐ Send no money now.

sified as "phases A, B, and C", and four pedestrian buttons. The sequence of traffic lights (the actual sequence may omit phase B) is shown in the accompanying table .

Since the companies in the business are unwilling at present to reveal their trade secrets, for good reasons, it would be a good exercise for a computer man interested in switching to work out the circuits and operations.

SEQUENCE OF TRAFFIC SIGNALS

Signal No.	Dispatcher Phase A				Dispatcher Phase B		Dispatcher Phase C			
	Ped.	Prot.	Green	Change	Green	Change	Ped.	Prot.	Green	Change
1	R	R	G	G	G	G ⁽¹⁾	G	G	G	Y
2	R	R	G	G	G	G ⁽¹⁾	G	G	G	Y
3	G	G	G	Y	R	R	R	R	R	R
4	R	R	R	R	R	R	G-F	G-F	G	Y
5	R	R	R	R	G-L	Y	R	R	R	R
6	G-FR	G-FR	G-FR	G-FR ⁽²⁾	G-FR	Y	R	R	R	R
7	R	R	R	R	R	R	G-FL	G-FL	G	Y
8	WALK	W	W	W	W	W	W	W	W	W
9	WALK	W	W	W	W	W	W	W	W	W
10	W	W	W	W	W	W	WALK	W	W	W
11	W	W	W	W	W	W	WALK	W	W	W

Abbreviations:

R	Red	G-L	Green, left arrow; otherwise red	W	Wait
Y	Yellow	G-F	Green, forward arrow; otherwise red	Ped.	Pedestrian
G	Green	G-R	Green, right arrow; otherwise red	Prot.	Protection

Notes:

- (1) G replaced by Y if Phase C is to be skipped, and there is to be a Phase A Pedestrian Period.
- (2) G-FR replaced by Y if Phase B is to be skipped.

ROSTER OF ORGANIZATIONS IN THE FIELD OF COMPUTERS AND AUTOMATION

(Edition 9, supplement, information as of June 15, 1953)

The purpose of this Roster is to report organizations (all that are known to us) making or developing computing machinery, or components or data-handling equipment, or equipment for automatic control and materials handling. Each Roster entry when it becomes complete contains: name of the organization, its address, nature of its interest in the field, kinds of activity it engages in, main products in the field, approximate number of employees, year established, and a few comments and current news items. When we do not have complete information, we put down what we have. The term "components" as used here does not include nuts, bolts, resistors, condensers, motors, tubes, mercury, etc.; but does include magnetic drums, cores, tapes, and certain other components that have an intimate and significant connection with machinery covered in the Roster.

We seek to make this Roster as useful and informative as possible, and plan to keep it up to date in each issue. We shall be grateful for any more information, or additions or corrections that any reader is able to send us.

Although we have tried to make the Roster complete and accurate, we assume no liability for any statements expressed or implied.

This edition contains only revisions or additions as compared with Editions 7 and 8, published in the April and May, 1953, issues of COMPUTERS AND AUTOMATION, vol. 2, no. 2 and 3.

Abbreviations

The key to the abbreviations follows:

Size

Ls Large size, over 500 employees
Ms Medium size, 50 to 500 employees
Ss Small size, under 50 employees
(No. in parentheses is approx.
no. of employees)

When Established

Se Organization established a short
time ago (1942 or later)
Me Organization established a
"medium" time ago (1923 to
1941)
Le Long established organization
(1922 or earlier)

Interests in Computers and Automation

Dc Digital computing machinery
Ac Analog computing machinery
Ic Incidental interests in computing
machinery
Sc Servomechanisms
Cc Automatic control machinery
Mc Automatic materials handling mach-
inery

Activities

Ma Manufacturing activity
Sa Selling activity
Ra Research and development
Ca Consulting
Ga Government activity
Pa Problem-solving activity
Ba Buying activity
(used also in combinations, as in
RMSa, "research, manufacturing and
selling activity")

*C This organization has very kindly furnished us with information expressly for the purposes of the Roster, and therefore our report is likely to be more complete and accurate than otherwise might be the case. (C for Checking)

*A This organization has placed an advertisement in this issue of COMPUTERS AND AUTOMATION. For more information, see their advertisement. (A for Advertisement)

ROSTER

- Alden Electronic and Impulse Recording Equipment Co., Alden Research Center, Westboro, Mass. *C, *A
Facsimile recording equipment and facsimile components. Ma SEE
Alden Products Co.
- Alden Products Co., 117 No. Main St., Brockton, Mass. *C, *A
General and specific components for digital and analog computing machinery; plug-in components, sensing and indicating components, magnetic delay line units, magnetic storage cores, etc. Ms(300) Me(1930) Ic RMSa
- Alfax Paper and Engineering Co., Alden Research Center, Westboro, Mass. *C, *A
Electrosensitive recording papers. Ma SEE Alden Products Co.
- Automatic Signal Division, Eastern Industries, Inc., Norwalk, Conn.
Automatic volume-density traffic controllers. Me Ic RMSa
- Burroughs Adding Machine Co., 6071 Second Ave., Detroit, Mich. — headquarters; Research Division — 511 No. Broad St., Philadelphia, Pa.; and elsewhere. *C *A
Adding machines, bookkeeping machines, etc. Research division has made Burroughs Laboratory computer, an electronic digital test computer, assembled from pulse control units. Also has completed a fast-access magnetic-core memory to be attached to Eniac; stores 100 numbers of 10 decimal digits; access time 20 microseconds. Pulse control components, servomechanisms. This company owns Control Instrument Co. Ls(18,000) Le(1896)
DSc RMSPa
- Computer Control Co., 106 Concord Ave., Belmont, Mass. *C
Computers and computer components. Solid delay line acoustic memory. Computer test equipment. Ss(11) Se(1952) Dc RMSCa
- Intelligent Machines Research Corp., 134 So. Wayne St., Arlington, Va. *C *A
Devices for reading characters on paper, etc. Pattern interpretation equipment. Sensing mechanisms. Digital computer elements. Ss(6) Se(1951) Dc RCMSa
- Laboratory for Electronics, 51 Pitts St., Boston 14, Mass. *C *A
Analog and digital computers, special computers to suit customer requirements, delay lines (mercury, quartz), plug-in packages for computer applications, etc. Ls(700) Se(1946) DAc RMSa
- Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N. Y.
Magnetic memory arrays. Affiliate of General Ceramics and Steatite Corp. Ms Se(1950) Ic RMSa
- Mechanical Handling Systems, Inc., 4600 Nancy Ave., Detroit 12, Mich.
Automatic conveyors for moving separate articles, large or small, heavy or light, etc., in manufacturing process. Ls Me Mc
RMSa
- Monrobot Corp., Morris Plains, N. J. *C *A
Monrobot automatic electronic digital computers. Subsidiary of Monroe Calculating Machine Co. Ss(32) Se(1952) Dc RMSa
- Monroe Calculating Machine Co., Orange, N. J., and elsewhere. *C
Desk calculating machinery for adding, calculating, and bookkeeping. SEE Monrobot Corp. Ls(4000) Me(1925) Dc RMSa
- Mountain Systems, Inc., 94 Lake St., White Plains, N. Y.
Data processing systems and digital computer systems. Ss Se
Dc RMSCa
- National Bureau of Standards, Electronics Division, Electronic Computers Laboratory, Washington 25, D. C. *C
Digital computers, data processing systems, input-output devices. Storage elements, transistors, diodes, delay lines, etc. Have designed and assembled Seac and Dyseac electronic digital computers, etc. Ms(110) Se(1946) Dc RCMBGa

Potter Instrument Co., 115 Cutter Mill Rd., Great Neck, N. Y. *C, *A
 Electronic counters. Electronic tag reader. Random access memory. High speed printer ("flying typewriter"). Ms(100)
 Se(1942) Dc RCMSa

Raytheon Manufacturing Co., Waltham, Mass. *C, *A
 Radar, fire-control, microwave equipment. Big fast electronic digital computers (Raydac), one delivered. Tape handling mechanisms, magnetic heads, magnetic cores, shift registers.
 Ls(20,000) Me(1924) DAc RMSa

Servomechanisms, Inc., 500 Franklin Ave., Garden City, N. Y., and elsewhere. *C
 Automatic control systems and components. Analog computers.
 Ls(700) Se(1946) ASc RMSa

Sylvania Electric Co., 70 Forsyth St., Boston 15, Mass. *C, *A
 Big fast electronic analog and digital computers, for government. Subassemblies of diodes and triodes. Ls(1200)
 Se(Company, 1901; this division, 1945) DAc RMSa

Transistor Products, Inc., Snow and Union Sts., Boston 35, Mass. *A
 Transistors for use in digital computers, etc. Ms(65)
 Se Ic RMSa

BOOKS AND OTHER PUBLICATIONS

(List 4: COMPUTERS AND AUTOMATION, vol. 2, no. 5, July, 1953)

This is a list of books, articles, periodicals, and other publications which have a significant relation to computers and automation and which have come to our attention. The main purpose of this list is to report the existence of information. If you write to a publisher or issuer, we would appreciate your mentioning the listing in COMPUTERS AND AUTOMATION.

We shall be glad to report other information in future lists, if a review copy is sent to COMPUTERS AND AUTOMATION.

The general plan of each entry is: author or editor / title / publisher or issuer / date, publication process, number of pages, price or its equivalent / a few comments. It is not planned to repeat entries in later issues of COMPUTERS AND AUTOMATION except where corrections or changes are involved.

1. American Management Association / Automation and Other Technological Advances, Manufacturing Series No. 205 / American Management Association, 330 West 42nd St., New York 36, N.Y. / 1953, printed, 55 pp, \$1.25 to non-members

Contains five papers on automation, presented at the Manufacturing Conference of the American Management Association held in Cleveland, December 3-5, 1952. The title of the panel session was "Developments in Automation"; the papers include "Problems in the Push Button Factory" by M.J. Murphy, "Mechanization of Small-Batch or Step-by Step Production" by R.H. Sullivan, "The Role of Design in Automation" by J.E. Arnold, and "Effecting a Continuous Flow of Process Materials", by F. A. Landee.

2. Brown, David R., and Ernst Albers-Schoenberg / Ferrites Speed Digital Computers / front cover and 4 pp in "Electronics", April, 1953, McGraw-Hill Publishing Co., 330 West 42 St., New York. Reprints available from General Ceramics and Steatite Corp., Keasbey, N.J.

The properties of a ferromagnetic ceramic material called "ferrite" with a nearly rectangular hysteresis loop are discussed. It has been applied in the form of small toroidal cores as high-speed memory for digital computers. Contains diagrams of the hysteresis loop, pulse tests, memory arrays, etc.

3. Institute of Radio Engineers' Professional Group on Electronic Computers, No. PGEC - 1 / Institute of Radio Engineers, 1 East 79 St., New York 21, N.Y. / December, 1952, photooffset, 76 pp, this issue \$4.50 to non-members

Contains nine papers relating to electronic computers presented at the Western Electronic Show and Convention, Long Beach, Calif., Aug. 27-29, 1952. Subjects discussed include an airborne digital computer, design of flip-flop circuits, operating experience with the UNIVAC, applications of CRC-105 decimal digital differential analyzer, an electronic multiplier, the plotting of flaws using ultrasonic beams, etc,

4. Joint AIEE-IRE-ACM Computer Conference / Review of Input and Output Equipment used in Computing Systems / American Institute of Electrical Engineers, 33 West 39 St., New York 18, N. Y. / March 1953, printed, 142 pp, \$4

Contains 28 papers presented at the Joint Computer Conference held December, 1952, in New York City devoted to the characteristics and performance of input-output equipment of large-scale electronic digital computers. Input-output systems of the SEAC, UNIVAC, RAYDAC, and IBM 701 are discussed in detail. Contains numerous diagrams and photographs.

5. McGaw, Howard F / Marginal Punched Cards in College and Research Libraries / The Scarecrow Press, Washington 7, D C / 1952, photooffset but bound in hard covers, price not stated

This book is intended to introduce librarians of college and research libraries to the advantages of marginal punched cards. Chapters cover principles, equipment and supplies for a typical installation, coding and sorting methods, use of the cards in the circulation and other departments, special equipment, and various manufacturers' different card systems.

6. Mechanical Handling Systems Inc. / Monoveyor, Conveyor Chains, Floor Conveyors, Tow-Line Conveyors, etc. / Mechanical Handling Systems Inc., 4600 Nancy Ave., Detroit 12, Mich. / 1951 and earlier, printed bulletins, about 250 pp, limited distribution

This manufacturer's catalogue, including reprints of papers published in several technical magazines, is an illuminating description of automatic mechanical handling of separate articles in manufacturing processes. Monoveyor is an overhead monorail conveyor using hooks and frames on an endless, powered chain running on trolley wheels. It is very flexible, and is useful for carrying light or heavy parts from one manufacturing operation to another. It will feed final assembly lines, or transport parts through drying ovens, sand blasts, paint sprays, dipping operations, etc. The other bulletins describe and show applications of conveyor chains, floor conveyors, and other equipment for easy, flexible, mechanical handling.

7. Monrobot Corporation / Operating Instructions, Monrobot Electronic Calculator Model III / Monrobot Corporation, Morris Plains, N J / 1953, photooffset, 42 pp, free

The Monrobot III Electronic Calculator is a general-purpose, sequence-controlled calculator having twenty decimal-digit capacity with decimal point fixed between the tenth and eleven decimal digits. This report describes the equipment, orders, operating instructions, samples of programs, etc. Contents: Part I, Introduction; Part II, Operating Instructions; Part III, Programming.

8. Schooley, Allen H / Simple Computer Automatically Plots Correlation Functions, pp 71-3... in Tele-Tech / Caldwell-Clements, Inc., Bristol, Conn / May, 1953, printed, 166 pp, 75¢

"Simcor", a simple analog computer, is described in detail with diagrams. "Simcor" can compute the autocorrelation function using input information from motion picture film tapes and produces the answer on a paper strip. The machine is simple and sufficiently accurate for many practical autocorrelation studies including radar noise and ship deck motion.

9. Servomechanisms Laboratory, Mass. Inst. of Technology / A Numerically Controlled Milling Machine / Servomechanisms Lab., Mass. Inst. of Technology, Cambridge 39, Mass / 1951, printed, 11 pp, probably free
Describes precision control of a machine tool by means of punched tape instructions, an interpreter, and servomechanisms. Numbers expressing the requirements of the blueprint direct the entire operation of the machine. Contains diagrams and drawings.
10. Walter, W. Grey / The Living Brain / W.W. Norton and Co., 101 5th Ave., New York/ 1953, printed, 311 pages, \$3.95
A discussion of the human brain, its evolution, electrical observations of the brain, comparison with Walter's "Mechanical Turtle," etc. Full of allusions and generalizations. Three appendices are specific and give an electric model of a nerve, the design of the mechanical turtle, and the design of a "conditioned reflex analogue".
11. Joint IRE-AIEE-ACM Computer Conference / Proceedings of the Western Computer Conference, February 4-6, 1953 / Institute of Radio Engineers, 1 E. 79 St., New York 21, N.Y. / 1953, photooffset, 253 pages, \$3.50
Contains about 20 papers given at the Joint Computer Conference in Los Angeles, Calif., February, 1953. The subjects covered include an evaluation of digital and analog computers, commercial applications of computers, airplane problems, etc.

Manuscripts. We desire to publish articles that are factual, useful, understandable, and interesting to many kinds of people engaged in one part or another of the field of computers and automation. In this audience are many people who have expert knowledge of some part of the field, but who are laymen in other parts of it. Consequently, a writer should seek to explain his subject, and show its context and significance. He should define unfamiliar terms, or use them in a way that makes their meaning unmistakable. He should identify unfamiliar persons with a few words. He should use examples, comparisons, analogies, etc., whenever they may help readers to understand a difficult point. He should give data supporting his argument and evidence for his assertions. An article may certainly be controversial if the subject is discussed reasonably.

Ordinarily, the length should be 1000 to 4000 words, and payment will be \$10 to \$50 on acceptance. A suggestion for an article should be submitted to us before too much work is done. To be considered for any particular issue, the manuscript should be in our hands by the first of the preceding month.

HOW TO TALK ABOUT COMPUTERS

by Rudolf Flesch

Author of "The Art of Plain Talk" and many other books

Experts in all fields are vexed by the perennial problem of explaining their specialty to laymen; but the expert in the computing machinery field has an additional problem that is unique. Not only is his subject fantastically complex and far removed from the realm of everyday experience; it is also, in its essential nature, deeply disturbing to every human being. For there is no getting away from the fact that computing machines are thinking machines — or "thinking machines" in quotation marks — or machines that do something closely parallel to human thinking — or roughly parallel — or, at any rate, machines that do something the layman feels that machines aren't supposed to do. So, in explaining computers to the public, the expert is up against a deep-seated resistance — and I mean "resistance" in the full-fledged Freudian sense; an active, forceful struggle against a vital, important insight.

Do the machines think, or don't they? Can they properly be called "brains"? Is it permissible to use the term "memory"? Are any anthropomorphic terms useful in communicating the subject to laymen, or do they block understanding?

The dilemma has been with us ever since public discussion of computing machines started. There are two schools of thought — the "they-do-think" school and the "they-don't-think" school — and, I am tempted to believe, there always will be. The arguments on both sides seem equally persuasive. On the one hand, we have the indisputable logical conclusion, admirably expressed by Edmund C. Berkeley in "Giant Brains": "A machine can handle information; it can calculate, conclude, and choose; it can perform reasonable operations with information. A machine, therefore, can think." This view has also been expressed by Claude Shannon, mathematician and scientist, and by other investigators. On the other hand, there are innumerable, equally forceful statements by other men eminent in the field, pointing out that machines perform only operations built into them by human beings: if they can be said to have thoughts, theirs are only second-hand, prefabricated thoughts.

So the awkward truth seems to be that computing machines think, and yet they don't. Is it then all a matter of definition? Are we dealing with a problem in semantics? What does "thinking" mean anyway?

Let's consult the dictionaries. Webster: "To have in or call to one's mind a thought." Oxford: "To conceive in the mind, exercise the mind." American College Dictionary: "To use the mind, especially the intellect, actively."

All right; let's follow the references and look up "mind". Webster: "That from which thought originates." Oxford: "The seat of consciousness, thoughts, volitions, and feelings." American College Dictionary: "That which thinks, feels, and wills, exercises perception, judgment, reflection, etc., as in a human or other conscious being."

And so our little semantic excursion instructs us that the problem is not one of semantics. Thinking, by the definitions cited, is something that has to do with the mind; and mind, by definition, implies consciousness, humanness, or at least animality. Semantically, theoretically, on paper, it may be possible to say that an electronic computing machine has a mind; practically, as a matter of everyday life and normal human feelings, it hasn't. The notion of a mind composed of hardware, electronic tubes, wires, magnetic tape, and whatnot is not only novel and unorthodox: the notion is so repugnant to an ordinary human being as to be virtually impossible for him to entertain.

Where, then, should we look for the solution to our problem? Obviously the study of language and semantics doesn't furnish the answer. If we honestly try to study the problem through, we find that our problem is largely one of psychology, of philosophy, even of metaphysics. Man is a being that thinks; can he create another thinking being? No man so far has given a conclusive answer to this question; all anyone can do so far is state an opinion and reveal his Weltanschauung, his world-philosophy, in the process.

For the answer to the question "Can machines think?" is much like a projective test of personality. Those who say "yes" are self-confident humanists, unafraid of pursuing the road of scientific progress wherever it will lead, free of conventional fears and superstitious worries, rejoicing in the achievements of mankind.

And those who deny the power of thought to machines? They may be doubters, pessimists, people afraid of flights of imagination, unadventurous souls who do not dare touch the strong wine of great ideas. Or...

Or they may be otherworldly thinkers like Pascal, who wrote 'Man is a thinking reed... All our dignity lies in thought...', and who had this to say, in 1660, about computers: "The arithmetical machine produces effects which approach nearer to thought than all that animals do; but it does nothing which can cause it to be said that, like animals, it has will." Man, according to Pascal, can make a machine that approaches thought but only God can make a being that thinks.

Where does all this discussion leave us in regard to the practical problem of talking about computing machines to laymen? Possibly with this solution: Let's not too blithely use the word "think" and other anthropomorphic terms, for they will disturb the layman, stir up his unconscious prejudices, make him resist the insights he might otherwise gain from a study of automatic computers. On the other hand, let's never leave the great analogy out of sight. Computers are in fact tremendously significant exactly because they do something that comes close to thought; and nobody can understand more than a fragment about them unless he sees this parallel.

At last Man, in the middle of the twentieth century, has created homunculus, a manikin. This is a fact; but it may have an allegorical, metaphysical meaning that is not yet clear to us.

(COMPUTERS AND AUTOMATION invites discussion of this important and controversial subject.)

FORUM

1. Symposium III on Simulation and Computing Techniques. From Project Typhoon, Analytical and Computer Department, U.S. Naval Air Development Center, Johnsville, Pa.:

A Symposium on Simulation and Computing Techniques is scheduled for October 12 to 14, 1953 and will be held in the Philadelphia area. This is the third in a series of symposia on this subject, the first two having been under the sponsorship of the U.S. Navy Special Devices Center at Project Cyclone.

It is planned to cover topics in: (1) general simulation, both mathematical and physical ... including nonphysical problems (economic, logistic, etc.); (2) advances in computer design, techniques, and applications; (3) methods of determining and improving the accuracy of analog solutions; checking procedures; and error analyses....

Persons planning to attend have been requested to notify Project Typhoon as soon as possible to facilitate the arrangements.

* * *

2. A Fair Price for a Magazine and Other Subjects. From N.A. Denman, Falmouth, Mass.:

I think "Computers and Automation" is an excellent magazine, and the ten issues are certainly worth the price. If some of your readers want volume for low cost, the New York Telephone Directory is free. The comments that it is not large enough for the price are silly.

Please continue to maintain the dignity and factualness of your advertising space. You have an excellent advertising policy.

Our thanks to you, Mr. Denman.

Mr. Denman is commenting mainly on a letter published in the January issue, in which a reader said that he was returning the magazine, although he very much enjoyed reading it, because he thought the subscription price was excessive. At that time we were publishing the magazine four times a year, and the subscription price per issue was 87½ cents. We now publish ten times a year, and the subscription price per issue is 45 cents (although the single copy price is \$1.25 unchanged).

We continually investigate and study how to publish a magazine which is as interesting and useful to our readers as we can make it, and is sold for a fair price. There is some evidence that we are succeeding, for our subscriptions have increased from about 600 at the beginning of March to about 880 at the middle of June. But in order to accomplish our objective fully, we need responsiveness from our readers.

There are four things that we seek all the time. First: articles — interesting, not too technical, yet meaty, reports and discussions on subjects related to computers, automation, cybernetics, and robots. If any of you have any idea about something that is worth saying or discussing, tell us, and plan to write an article for us if you want to. Second: subscribers — because they are the foundation for all that we seek to do. Third: advertisements — because we think we can render a unique

service, bringing information that is factual and worth reading about products and services to all those people who are really interested in the field of computers and automation; and also because advertising means income for the magazine. And fourth: responses — because they are the feedback for the communication system which this magazine desires to be. If you like what we do, and if you don't like what we do, please tell us. We want all kinds of responses — plenty of signal for the adjustment of this communication system.

* * *

3. Noted with Appreciation. From Mr. David B. Johnson, Minneapolis, Minn.:

I enjoyed the article on Ciphers, and Mr. Hegedus' letter in the April, 1953 issue.

* * *

From William H. Cummins, Baltimore, Md.:

I am hopeful that a continued expansion of circulation will permit your new magazine to become one of the most popular professional journals.

PATENTS

by Hans Schroeder, Milwaukee, Wisc.

Compilation of patents pertaining to computers and associated equipment from the Official Gazette of the United States Patent Office, Vol. 670, No. 2, May 12, 1953

- 2,638,267, Binary Multiplying Circuit / G C Hartley and William John Reynolds, London, England / asgnd to Internatl Standard Electric Corp, New York / A multiplying circuit for numbers in binary form, using relays.
- 2,638,268, Computer for Evaluating Complex Integrals / R M Redheffer, Cambridge, Mass / asgnd to USA, Sec Nav / Evaluates integrals of the form $\int f(x)g(x)dx$ using two sets of rheostats, one of which is used for each of the two functions.
- 2,638,269, Ballistic Mechanism / C G Holschuh, Huntington, and D Fram, Brooklyn NY / asgnd to Sperry Corp / Mechanical computer for correcting gun aim.
- 2,638,270, Mechanism for Sensing Statistical Record Cards / C T A Jones, Wallington, Eng / asgnd to Powers-Samas Acctg Machines, Ltd., London, Eng / Card sorting device containing two successive sensing elements.
- 2,638,275, Accumulator for Use in Statistical Machines / A Thomas, Wallington, Eng / asgnd to Powers-Samas Acctg Machines, Ltd., London, Eng / Mechanical accumulator.
- 2,638,493, Integrating Circuit / J W Trischka, New York, and H S Sack, Ithaca, NY / asgnd to USA, Sec Nav / Device for adding several direct currents by observing magnitude of harmonics of an alternating current generated in a saturable reactor energized by the direct currents.
- 2,638,502, Solenoid Delay Line / J R Pierce, Berkeley Heights, N J / asgnd to Bell Tel Lab, New York / Delay line consisting of single-layer solenoid coaxially spaced between an inner and an outer conducting tube.
- 2,638,506, Electric Storage of Information on Gas-Filled Tubes / F H Bray, G C Hartley, and D S Ridler, London, Eng / asgnd to Internatl Standard Electric Corp, New York / Information storage unit using a number of gas-filled diodes and an associated switching system.
- 2,638,541, Impulse Counting Tube / J T Wallmark, Bromma, Sweden / asgnd to RCA / Counter tube and associated circuit using secondary emission anodes spaced about a central cathode. Output will equal input divided by number of anodes.
- 2,638,564, Stabilizing Means for Cold Cathode Tube Flip-flop Circuits / C R Williams, Hawthorne, and G E Hagen, Lawndale, Calif / asgnd to Northrop Aircraft, Inc / Flip-flop circuit employing gastube with two cathodes and a selenium rectifier in series with the input capacitor.

WHO'S WHO IN COMPUTERS AND AUTOMATION: SECTION 3

-- NOT BUSINESS, NOT PROGRAMMING -- E TO K

(First edition, cumulative, information as of June 10, 1953)

This is a fifth installment of a Who's Who of individuals in the field of computers and automation. The purpose of this Who's Who is to make it easier for all persons interested in this field to get in touch with each other in appropriate ways.

Contents. The following list consists of persons interested in computing machinery who have not reported as a main interest either "programming" or "business", for whom information has been received up to June 10, 1953, and whose last name begins E to K.

Reporting. If you are interested in any phase of computing machinery, robots, cybernetics, or automation, and if you would like to be included in the Who's Who, please send us: your name (please print), address, organization (and its address), your title, main interests (note list appearing under "Entry" below, and specify any other interests), year of birth, your college or last school, years of experience in the field, your occupation, and any more information about yourself that you may care to furnish. (A card for your Who's Who entry is bound in with this issue.) Your listing in the Who's Who does not depend in any way on your subscription to COMPUTERS AND AUTOMATION although of course your subscription will be welcome.

Entry. Each entry in the Who's Who when it becomes complete contains: name / title, organization, address / interests / year of birth, college or last school (background), years in field, occupation. The address has been substantially contracted to avoid the nuisance of unwanted mail. In cases where no information has been given (for example, about occupation) a "-" denotes omission.

Abbreviations. Since a great deal of information is to be presented, abbreviations have been extensively used. Nearly all these abbreviations can be easily guessed, like those in a telephone book. The letters A,B,C,D,E,M,P,S stand for main interests "Applications, Business, Construction, Design, Electronics, Mathematics, Programming, Sales" respectively.

Liability. Although we have tried to make each entry complete and accurate, we assume no liability for any statements expressed or implied.

Corrections. We shall be very grateful for any information, additions, or corrections that any reader is able to send us.

Roster

E: Earshen, John J / asst engr, Cornell Aeronautical Lab, Buffalo, N Y / ADE, medical aplcn / '28, MIT, U of Buffalo, 2, elecnc engr
 Eckdahl, D E / vp & gen mgr, Computer Res Corp, Hawthorne, Cal / ACDS / '24, Univ So Cal, 6, engr
 Edwards, Ralph E / acty, Baltimore Life Ins Co, Baltimore / - / -, BS(Eng) MA(Math) -, acty
 Ehle, Harry A / vp, Intl Resistance Co, Phila / ES / '07, -, 15, -
 Eisner, Elmer / physicist, Texas Co, Houston, Tex / ADM / '19, Johns Hopkins U, 4, physicist
 Elbourn, Robert D / -, Natl Bur Std, Wash, D C / DE / '19, Purdue, 7, elcnc engr
 Ely, Ray / grp acty, Gen Amer Life Ins Co, St Louis, Mo / AM, ins rates / '05, U Wisc ('33), U Nebr ('31), 20, acty
 Epstein, Herman / suprvr, Burroughs Adding Mach Co, Phila / D, input-output res compnts / '26, Yale (PhD), 3, -
 Epstein, Robert I / 2nd Lt US Army / DS / '28, Cornell U, -, mech engr
 Erickson, Robert S / proj engr, Engrg Res Assoc, St Paul, Minn / CDE / '20, U Minn, 6, elec engr
 Every, Maurice A / tech engr, IBM, Pkpsie, N Y / DE/-, Tri-State Coll Ind, 1, -

F: Fagen, Wm F / assoc prof, U of Florida, Gainesville / CDE / '16, Louisiana State U, 15, teaching & res
 Fallows, Richard S / ch engr, Sylvania Elec Prod Inc, Mass / ACDE / '20, MIT, U Mich, 4, engr
 Farrell, Crumpton / proj ofcr, Nav Ordn Plant, Indianapolis / A, military aplcns, airborne / '22, MIT ('48), 2, -
 Fawcett, Daniel Gordon / elecnc res engr, Monroe Calc Mach Co, Orange, N J / DE, magnetic res / '27, MIT(SBEE), Stevens (MSSEE), 2, elecnc engr
 Fein, Louis / pres, Comp Contr Co, Belmont, Mass / ACD / '17, Brown U, 5, physicist
 Feit, Louis / proj engr, Fed Telecomm Labs, Nutley, N J / ADE / '21, NYU, -, -
 Felker, J H / radio dev engr, Bell Telephone Labs, N J / AD / '19, Wash U, 4, elec engr
 Ferrell, Enoch B / res engr, Bell Telephone Labs, N J / E, tel switchg / '98, Okla U, 15, tel engr
 Ficken, F A / prof, U of Tenn, Knoxville / M / '10, Princeton, -, teacher & res
 Fitzgerald, Thomas J, Jr / dev engr, Eckert-Mauchly, Phila / CDEM / '21, MIT, 3, elecnc engr
 Flood, Francis T / elec engr, Technitrol Engrg Co, Phila / ACD / '24, Villanova Coll, 1, test engr
 Flood, Merrill M / -, -, Santa Monica, Cal / AM / '08, Princeton U, 15, res sci
 Fondrk, John S / physicist, Elecncs Lab, Gen Elec, Syracuse, N Y / D / '22, Carnegie Inst Tech, 1, physicist
 Forbush, Lothrop M / sr engr, Gen Motors, Detroit, Mich / A / '17, Harv, MIT, -, mech engr
 Forrester, Jay W / dir, Dig Comp Lab, MIT, Camb, Mass / - / '18, MIT, -, -
 Forsythe, George E / mathn, Natl Bur Std, Los Angeles / M / '17, Brown U, 4, mathn
 Fox, Phyllis / stud, MIT, Camb, Mass / AM / '23, MIT(MEE, PhD cand), 6, -
 Fox, L / sci staff, Natl Physical Lab, Middlesex, England / AM / '18, Oxford U, England, 12, -
 Freeman, Herbert / proj engr, Sperry Gyroscope Co, Gt Neck, N Y / E / '25, Columbia U, 5, res & dev engr
 Fuhlrodt, Norman T / exec vp & acty, Central Life Assur Co, Des Moines, Iowa / A, ins aplcns / '10, U Mich, 16, acty

G: Gaffney, John F / des engr, IBM, Vestal, N Y / DE / '25, MIT, 6, engr
 Galluppi, Albert J / serv engr, Picker X-Ray Corp, Phila, Pa / DEM / '23, Amer TV Inst Tech, 0, engr

Galman, Herbert / chf elecnc engr, Arga Instr Co, Phila, Pa / DEM, elecnc comp des, funcn fitting / '21, Drexel Inst, U Pa, 10, engr

Galvin, H B / chf physicist, Spec Prod Div, Victoreen Inst Co, Ohio / ACDEM / '12, Ohio State U, 2, physicist

Garrett, George A / chf mathn, K-25 Plant, Carbide & Carbon Chem Corp, Oak Ridge, Tenn / AM / '10, U Miss, Rice Inst, 3, mathn

Garrett, Lewis F / comptroller, USAF, Wash, D C / DE / -, Coe Coll, State U Iowa, 2, elecnc sci

Gaskill, Roger A / res assoc, WRRC, Ypsilanti, Mich / ADE, simuln & servo aplcns / '27, MIT, 3, elec engr

Gerlach, Albert A / engr, Armour Res Foundn, Chic / EM / '20, Ohio State U(BS), 111 Inst Tech(MS in EE & Math), 3, res engr

Gerlough, D L / asst engr, U Cal, Los Angeles / DE / '16, U Cal, 5, engr

Gewant, Stanley / elecnc engr, Fairchild Guided Missiles Div, N Y / DE / '25, CCNY, 3, elecnc engr

Geyer, Bernard H, Jr / -, Gen Elec Co, Syracuse, N Y / ACDE / '26, MIT, 3, engr

Gibson, Jack C / apld sci rep, IEM, Rochester, N Y / ASM / '22, Yale U, 2, sales

Gilmore, Ralph M, Jr / res assoc, WRRC, Ypsilanti, Mich / DE, log des / '26, Ga Tech, 1, -

Glaser, Ezra / economist, Bur of Budg, Wash, D C / A, econometrics / '13, Columbia U, -, statn

Glassman, I / sr res engr, Franklin Inst, Phila / AEM / '10, Harv U, 12, elecnc engr

Gluck, Simon E / assoc, Res Div, Moore Sch of Elec Engrg, Phila / CDE / '21, MIT, U Pa, 6, elecnc engr

Gold, David / engr, Fire Control, Navy Dept Bur of Ordn, Wash, D C / CDE / '15, -, -, -

Goldstein, Gordon D / elecnc engr, Appld Math Div, Nav Ordn Lab, Silver Spring, Md / ADE / '17, Clarkson Coll Tech, 2, elecnc engr

Goode, Harry H / dir, WRRC, Ypsilanti, Mich / mgt of constr, aplcn & res / '09, -, 5, -

Goodman, Robert M / sr engr, Amer Elecnc Labs, Phila / ADE / '20, Moore Sch EE, 5, el-
ecnc engr

Goodwin, David P / engr, Eckert-Mauchly Div, Phila / CDEM / '27, Penn, 3, -

Goodwin, E T / supt, Natl Physical Lab, Middlesex, England / AM / '13, Camb U, England, 14, -

Gordon, Bernard M / proj engr, Lab for Elecncs, Boston / ADE, sys contr & data proc / '27, MIT(BS & MS), 5, engr

Gorman, Raymond V / elecnc sci, Aberdeen Prvg Grnd, Md / DE, dev / '18, NYU, 3, engr

Graham, Beardsley / asst dir, Stanford Res Inst, Stanford, Cal / ACDE / '14, U Cal, 6, engr

Grant, Robert B / suprvr, Southwest Res Inst, San Antonio, Tex / A / '22, Wash U, 2, mathn

Graves, Carl D / res assoc, U Mich / AM / '28, U Mich, 2, physicist

Gray, Harry J, Jr / assoc in EE, Moore Sch of EE, Phila / DEM, teaching / '27, U Pa, 5, -

Greatbatch, Wilson / assoc engr, Cornell Aero Lab, N Y / ADE, airborne comp / '19, Cornell U, 3, -

Greenwald, Sidney / grp leader, Elecnc Comp Sec, Natl Bur Std, Wash, D C / DE / '14, Geo Wash U, 6, elecnc engr

Greenwood, T Spencer / res engr, Dig Comp Lab, MIT, Camb, Mass / D, memory / '24, MIT, Nwn, 2, -

Gregg, Charles R / chf, Meth Res & Anal Ofc, USAF, Wright-Patterson AFB, Ohio / A / '18, UCLA(BA), Geo Wash U(MA), 3, USAF ofcr

Griest, R Howard / assoc hd, Guided Missile Labs, Hughes Aircraft, Cal / AD / '09, Cal Inst Tech, 8, -

Grisamore, Nelson T / res assoc, Geo Wash U, Wash, D C / EM / '21, Geo Wash U, 3, physi-
cist

Gros, James R / elecnc engr, Naval Prvg Grnd, Dahlgren, Va / DE / '15, U Mich, 3, -

Gross, Francis J / chf, Air Traf Contr, Civ Aero Adm, Tech Dev Center, Indianapolis / AD, aplcn air traf contr / '11, U Wash, 4, elecnc engr

Grossman, Sol / suprvr, Philco Corp, Phila / ADE / '24, U Pa, 3, -
 Gunther, Clarence A / asst chf engr, Eng Prods Dept, RCA Victor Div, Camden, N J / - /
 '03, Princeton U(BSE), -, -
 Gushee, Charles H / pres, Financial Pub Co, Boston / A / '03, Harv, 25 as user, pub

H: Haberman, Rudolph, Jr / engr, Gen Elec Co, Schenectady, N Y / A / '27, U Mich, 3,
 engr
 Haggett, Robert / engr, Comp Lab, Aberdeen Prvg Grnd, Md / DE / '13, U Maine, 5, engr
 Halijak, Charles A / elecnc engr, Goodyear Aircraft Corp, Akron, Ohio / EM / '22, U
 Wisc, 2, elecnc engr
 Hall, Albert C / tech dir, Bendix Res Labs, Detroit, Mich / - / -, MIT, 10, -
 Halstead, Walter K / suprvr, RCA Victor, Camden, N J / - / '16, MIT, -, -
 Hamsher, Donald H / physicist, Signal Corps Engrg Labs, Red Bank, N J / A / -, Rutgers
 U, -, physicist
 Haneman, Vincent S, Jr / capt, USAF, USAFIT, U Mich, Ann Arbor, Mich / ADEM / '24, U
 Mich, 3, res & dev ofcr
 Hansen, Arthur Stedry / -, Actuarial Serv Corp, Lake Bluff, Ill / AM / '02, -, -, -

Hardenbergh, George A / proj engr, Minn Elecnc Corp, St Paul, Minn / CDE / '18, Cal
 Inst Tech(BS Apld Physics), 6, -
 Harding, W G / res asst, WRRRC, Ypsilanti, Mich / E / '21, U Toledo, 1, engr
 Hardy, Florian J / servo engr, Bell Aircraft Corp, Buffalo, N Y / M, analog comp / '22,
 Duquesne U, 2, engr
 Hardy, Norman / -, Intl Resistance Co, Phila / E, control / -, -, -, -
 Hargens, C W / sr staff engr, Franklin Inst, Phila / ACDE, res & dev / '18, MIT, 5, -
 Harrold, Wm T / elecnc engr, Tally Register Corp, Seattle, Wash / E / '16, U Wash, 2,
 engr
 Hart, Donald E / res engr, Gen Motors Res Labs, Detroit, Mich / AD, info index & re-
 trieval, des spec sys / '24, Rensselaer Polytech Inst, 3, -
 Haueter, Ruth C / elecnc sci, Natl Bur Std, Wash, D C / CDE / '21, U Wyo, 5, -
 Hauser, Arthur A, Jr / engrg sec hd for elecnc, Sperry Gyroscope Co, Gt Neck, N Y /
 res & dev / '20, MIT, 10, engr
 Hawisher, Robert D / cutter grinder, Ex-cell-o Corp, Detroit, Mich / CDEM / '21, -, 0,-
 Hay, A Donald / sr staff engr, Franklin Inst, Phila / ADEM / '17, Princeton U, 3, res
 engr
 Hazen, John W / res consltnt, Los Angeles / ACDE, res, mfg / '00, U Cal, 8, teacher &
 consltnt
 Hebenstreit, W B / assoc hd, Adv Elecnc Lab, Hughes Aircraft, Cal / E / -, U Chic, NYU,
 Cal Inst Tech, -, -
 Hensley, Carlton B / -, -, Wash, D C / CDE / '31, Oberlin Coll, 2, stud
 Hegedus, Gene J / -, -, L I City, N Y / ACDEM / '07, Rustin Coll of Eng Sci, 2, techn
 Herriot, John G / assoc prof math, Dir Comp Lab, Stanford U, Cal / M / '16, Brown U
 Grad Sch, -, teacher
 Herzog, Robert G / vp, Universal Gen Corp, N Y C / E / '07, CCNY(EE), 9, engr
 Hibbard, John M / mech engr, self-emp, Redwood City, Cal / ACDEM / '19, Colo Coll, 4,-
 Hight, Stuart C / -, Sandia Corp, Albuquerque, N Mex / CDE / '06, U Cal, Columbia U,
 6, res engr
 Hill, John L / staff engr, Engrg Res Assoc, St Paul, Minn / ACDE / '09, Rochester Inst
 Tech, 7, elec engr
 Hobbs, Linder C / engr, Radio Corp Amer, N J / - / '25, Ga Tech(BEE), U Pa(MS), 3, engr
 Hobday, Charles / prodn engr, Shuve Bros, Chic / CSM / -, U Chic, -, -
 Hock, Roy E / res assoc, WRRRC, Ypsilanti, Mich / CD, log des, constr Midac / '29, Wayne
 U, 2, elec engr
 Hofheimer, Richard W / staff mbr, MIT, Camb, Mass / CDE / '17, Harv, 6, elecnc engr

READER'S INQUIRY CARDS

Suppose you wanted to find out more information about something referred to in one of the advertisements in **COMPUTERS AND AUTOMATION** — suppose you wondered what an operational amplifier was — suppose you wondered if you could use a certain small magnetic core memory — suppose . . .

What would be the most convenient way for you to find out?

Thinking about the answer to that question, we have adopted "Reader's Inquiry Cards". One of them is below. We hope it will be a convenience to you.

The CA numbers on the card refer to the CA numbers shown in the index to advertisements.

Edmund C. Berkeley and Associates

Publishers of **COMPUTERS AND AUTOMATION**

36 West 11 Street

New York 11, N. Y.

To: **COMPUTERS AND AUTOMATION**

Date.....

1. Please send me additional information on the following subjects for which I have circled the CA number:

1	2	3	4	5	26	27	28	29	30	51	52	53	54	55	76	77	78	79	80	101	102	103	104	105	126	127	128	129	130
6	7	8	9	10	31	32	33	34	35	56	57	58	59	60	81	82	83	84	85	106	107	108	109	110	131	132	133	134	135
11	12	13	14	15	36	37	38	39	40	61	62	63	64	65	86	87	88	89	90	111	112	113	114	115	136	137	138	139	140
16	17	18	19	20	41	42	43	44	45	66	67	68	69	70	91	92	93	94	95	116	117	118	119	120	141	142	143	144	145
21	22	23	24	25	46	47	48	49	50	71	72	73	74	75	96	97	98	99	100	121	122	123	124	125	146	147	148	149	150

2. Remarks.....

Name (please print).....

Title.....

Organization.....

Address.....

Please
fill in
completely

FIRST CLASS
Permit No. 1680
Sec. 34.9, P. L. & R.
NEW YORK, N. Y.

BUSINESS REPLY CARD

NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

3c. - POSTAGE WILL BE PAID BY—

EDMUND C. BERKELEY AND ASSOCIATES
Publishers of COMPUTERS & AUTOMATION

36 West 11th Street

New York 11, N. Y.

Hopkins, Robert E / prof, Univ of Rochester, N Y / ACM, lens des / '15, U Rochester, -, teacher
 Horrell, Maurice W / asst gen mgr, Comp Div, Bendix Aviation Corp, Hawthorne, Calif / AD / '12, Kans State Coll, -, -
 Horton, Arthur W, Jr / -, Bell Tel Labs, Murray Hill, N J / CD, military / '98, Princeton, 10, -
 Horton, Wm P / sr engr, Comp Div, Raytheon Mfg Co, Waltham, Mass / CDE, circ & subsys des / '23, U New Brunswick, Canada(BS), 6, engr
 Hosken, James C / grp leader, A D Little, Camb, Mass / ACDE, res & dev / '08, Oxford, 5, -
 Hotelling, Harold / prof & assoc dir, Inst of States, Univ N C, Chapel Hill / AM, stat, econ / '95, Princeton(PhD), U Wash (AB), -, prof
 Hughes, Edwin L / staff engr, Intl Telemeter Corp, Los Angeles / DE / '24, U Ill, 4, engr
 Hunt, Clayton E, Jr / suprvg des engr, Camera Works, Eastman Kodak Co, Rochester N Y / CDE, hi-speed printers / '14, Worcester Polytech Inst, 3, mech engr
 Huntington, Allen / res engr, Calif Inst of Tech, Pasadena / CDE / -, Brown U, -, -
 Hutchinson, Gerald E / actl mathn, Soc Sec Admn, Baltimore, Md / AM / '13, U Iowa, 0, acty

I: Inselman, Edmund / mathn, Frankford Arsenal, Phila / M / '26, Columbia U, 1, mathn

J: Jacobson, Arvid W / assoc prof math, Wayne Univ, Detroit / AM / '04, U Mich, 4, teacher

Jacoby, Marvin / sr elec engr, Eckert-Mauchly Div, Phila / DM / '23, U Pa(MS), 5, -
 James, V E / mgr, Indust Contr Eqpt, Automatic Elec Sales, La Grange, Ill / S, relays & stepper switches / '06, Purdue, 7, mgr
 Jayne, Harold M / 2nd Lt. USAF, Bur Personnel, Wash, D C / E / '29, U Mo, 3, civ engr
 Jensen, Robert A / tech elecnr engr, IBM, NYC / ACDE / '24, Columbia U, 2, elecnr engr
 Jewett, John F / prod engr, Ferroxcube Corp Amer, Saugerties, N Y / AE / '20, Amherst Coll, 1, -
 Joel, Amos E, Jr / mbr tech staff, Bell Telephone Labs, NYC / ACDEM, res & dev, tel switching / '18, MIT, 8, elec engr
 John, Fritz / prof, Inst for Math & Mech, NYU, N Y / AM / '10, U Gottingen, 9, -
 Johnson, E Calvin / sr engr, Res Labs, Bendix Aviation Corp, Detroit / ADEM / '26, MIT (ScD), 5, engr
 Johnson, Jerry / apld sci dept rep, IBM, Dayton, Ohio / AS / '27, Harv, 4, salesman
 Johnston, John, Jr / cust engr, IBM, N J / ADE / '16, IBM Sch, ICS, DeForest, 15, engr
 Johnston, Ralph Wm / WRRRC, Ypsilanti, Mich / DE, testing mem eqpt / '27, U Wash(BSEE), 1, -
 Jungerwirth, Bernard R / assoc, E C Berkeley Assoc, NYC / ACD / '29, -, -, lab techn

K: Kates, Josef / res engr, Compn Cr Univ Toronto, Canada / CD, res & dev / -, -, 5, engr & consltnt

Katz, Abraham / res engr, Dig Comp Lab, MIT, Camb, Mass / ADEM / '22, MIT, 3, elec engr
 Katz, Amrom H / physicist, Photo Recon Lab, Wright Air Dev Cr, Dayton, Ohio / AM / -, Wisc, 0, physicist
 Katz, Stanley / mathn, Hydrocarbon Res, NYC / AM / '21, NYU, 3, mathn
 Kaufman, John / res assoc, WRRRC, Ypsilanti, Mich / CDE, compnt res & dev / '26, U Ill, 2, physicist
 Kaufman, H W / -, Rem Rand, Pa / DE / -, Columbia, -, -
 Keim, Frank J, Jr / res engr, Natl Union Radio Corp, East Orange, N J / CDE / '21, Stevens Inst Tech, 4, elecnr engr
 Kellington, Myrtle R / mathn, Natl Bur Std, Wash, D C / AM / '12, -, -, -
 Kenosian, Harry / res engr, Burroughs Adding Mach Co, Phila / CDE / '20, MIT, 7, elec engr

Kerfoot, Branch P, Jr / elecnc dev engr, RCA Victor Div, Camden, N J / ADE, analog /
 -, Yale U & U Mich, 5, engr
 Kernahan, John J J / mbr tech staff, Bell Telephone Labs, Whippany, N J / CD / '14,
 Newark Coll Engrg, 2, mech-elec designer
 Kessel, Benjamin / sr engr, Comp Dept, Raytheon Mfg Co, Waltham, Mass / DE, log des/
 '25, Texas Tech(BS), MIT(SM), 4, elec engr
 Kievit, Ben / mgr sales engrg, Sylvania Elec Prods, NYC / ES / U Toledo, U Ky, U Mich,
 -, -
 Kings, Leonard / hd, Spec Devices Sec, Maryland Elecnc Mfg Corp / ADE / '23, Ohio St
 U, 3, elecnc engr
 Kingsley, Benedict / tech writer, Eckert-Mauchly Div, Phila / EM / '23, NYU, 4, elecnc
 engr
 Kleene, S C / prof, Dept Math, Univ Wisc, Madison / M / '09, Princeton, O, mathn
 Klein, Edmund F / staff mbr, Los Alamos Sci Lab, Univ Calif, N Mex / ACDES / '27, U
 of Colo, 4, -
 Klein, Richard M / sales engr, Sylvania Elec Prods, NYC / AES, vac tubes / '21, CCNY,
 3, elec engr
 Klein, Rudolph J, Jr / -, Argonne Natl Lab, D-203, Lemont, Ill / DE / '29, Ga Tech,
 3, elecnc engr
 Klekotka, Rev John A / hd, EE Dept, Villanova Coll, Pa / E / '15, Villanova, Moore
 Sch EE, -, prof
 Klemperer, W B / res engr, Douglas Aircraft, Calif / - / '93, -, 8, engr
 Koch, John F, Jr / dir engrg & vp, Technitrol Engrg Co, Phila / CDE / '18, U Pa, 10,
 engr
 Koerner, John J / hd, Tab Bur, Assoc Hosp Serv, NYC / - / '18, St Peter's, -, -
 Kohler, Thomas R / physicist, Philips Labs, Irvington, N Y / ADE / '20, U Mich, -,
 physicist
 Kopp, Robert / chf, Elecnc Sec (Univac), USAF, Wash, DC/E/'19, G Wash U, 1, elcnc engr
 Kornei, Otto / res engr, Brush Dev Co, Cleveland, Ohio / magn mem, meth & devices /
 '03, Inst Tech, Vienna & Berlin, 15, -
 Kornfield, Nathaniel R / asst res engr, Burroughs Adding Mach Co, Phila / DEM / '24,
 U Pa, 3, -
 Kossack, Carl F / dir, Statl Lab, Purdue Univ, Lafayette, Ind / A / -, U Mich, -, statn
 Krill, Charles K / suprvr, Elecnc Dev, Librascope, Glendale, Cal / E, analog-dig comp/
 '16, Columbia U, 12, engr

BACK COPIES OF COMPUTERS AND AUTOMATION (BEFORE MARCH, "THE COMPUTING MACHINERY FIELD")

C 8: May, 1953, vol. 2, no. 4, 36 pp:

Reference Information: Roster of Organizations (16 entries)
Who's Who: Not Programming, Not Business, A to D (140 entries)
Glossary - C, D, E (50 entries)
Automatic Computers (10 entries)
Articles: "Compiling Routines", by G.M. Hopper
"Mechanical Translation", by A.D. Booth
"Medical Diagnosis", by Marshall Stone

.....\$1.25*

C 7: April, 1953, vol. 2, no. 3, 44 pp:

Reference Information: Roster of Organizations (173 entries)
Who's Who: Programming (120 entries)
Books and Publications (12 entries)
Articles: "The Art of Solving Secret Ciphers, and the Digital Computer,
by Fletcher Pratt
"Avenues for Future Development in Computing Machinery"
"Hungarian Prelude to Automation", by G.J. Hegedus

.....\$1.25*

C 6: March, 1953, vol. 2, no. 2, 44 pp:

Reference Information: Automatic Computers (76 entries)
Who's Who: Business (130 entries)
Roster of Organizations (26 entries)
Glossary - A, B (24 entries)
Articles: "Gypsy, Model VI, Claude Shannon, Nimwit, and the Mouse", by
G.A.W. Boehm
"Water and Computers"
"The Concept of Automation"
"The ERA 1103 Automatic Computer"

.....\$1.25*

C 5: Jan. 1953, vol. 2, no. 1, 48 pp:

Reference Information: Roster of Organizations (64 entries)
Who's Who: Programming (about 310 entries)
Books and Other Publications (5 entries)
Articles: "Brains, Electronic and Otherwise"
"What Computers Do"
"The Parameters of a Business Problem in Reading"
"Automatic Computers on Election Night"

.....\$1.25*

For information about Vol. 1, see page 29 of the May issue.

* A subscription may be specified to begin with this issue. Subscription rates, \$4.50 for one year, \$8.50 for two years, in the United States and Canada; \$5.50 for one year, \$10.50 for two years elsewhere.

----- MAIL THIS COUPON, or copy it -----

To: Edmund C. Berkeley and Associates, 36 West 11 St., S9, New York 11, N.Y.

1. Please send me the back copies circled: C8 C7 C6 C5
2. I subscribe to COMPUTERS AND AUTOMATION for _____ year(s). Please start my subscription with the issue of _____.

I enclose \$ _____ in full payment. My name and address are attached.

ADVERTISING — JULY, 1953

The purpose of COMPUTERS AND AUTOMATION is to be factual, useful, and understandable. For this purpose the kind of advertising we desire to publish is the kind that answers questions, such as: What are your products? What are your services? And for each product: What is it called? What does it do? How well does it work? What are its main specifications? Adjectives that express opinion are not desired. We reserve the right not to accept advertising that does not meet our standards.

Every advertisement in this issue, we believe, is factual and objective. For these reasons, we think that the advertising is likely to be worth reading. So far as we can tell, the statements made are reasonable, informative, and worth considering.

Following is the index to advertisements:

<u>Advertiser</u>	<u>CA No.</u>	<u>Subject</u>	<u>Page</u>
Alden Products Co.	62	Computer Components	31
Burroughs Adding Machine Co.	63	"Unitized" Pulse Control Equipment	30
Computers and Automation	64	Advertising in COMPUTERS AND AUTOMATION	33
Edmund C. Berkeley and Associates	65	Symbolic Logic and Other Courses by Mail	34
Intelligent Machines Research Corp.	66	Electronic Reading of Printed Characters, etc.	35
Laboratory for Electronics	67	Solid Delay Line	31
Monrobot Corp.	68	Monrobot Computer	36
Potter Instrument Co.	69	Digital Magnetic Tape Handler	32
Raytheon Manufacturing Co.	70	Tape Handling Mechanisms for Recording and Storing Digital Data	34
Sylvania Products	72	Germanium Diodes	37
Transistor Products	71	Point-Contact Transistors for High Speed Computers	35



"Unitized" Pulse Control Equipment saves engineering time and money

WHEN you use Burroughs "Unitized" Pulse Control Equipment, you eliminate much of the costly, time-consuming work of developing electronic test circuits. There is a Burroughs pulse control unit for practically every basic function in pulse circuit engineering. You need only plan a block diagram of the pulse circuits you want, assemble the necessary Burroughs units in the plug-in rack and interconnect them with the various standard coaxial cables and accessories. This can be done because each unit performs *one basic operation* such as generating, counting, mixing, gating, or delay.

JUST "PLUG IN" A BURROUGHS PULSE GENERATOR

Any of the three pulse generators offered by Burroughs demonstrates the practical one-basic-function principle behind Burroughs "Unitized" Pulse Control Equipment . . . you simply select the pulse generator for the job and plug in the cables.

Burroughs Pulse Generator, Type 1002B, generates 0.1 microsecond pulses at frequencies continuously variable from 0.2 megacycles to 4.5 megacycles in four overlapping bands. A calibrated, L-C controlled, sine-wave oscillator controls

the frequency. Output amplitude, which is only affected by frequency changes in the ranges above 2 megacycles, can be varied from 10 to 32 volts and the polarity of the output pulse is reversible.

Like other Burroughs units, this pulse generator is designed and engineered so that it can be added to equipment now in use, selected as a basic component of new equipment, or used repeatedly for testing or as a component in future pulse control jobs.

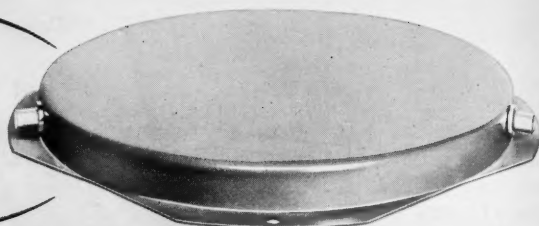
For full information on Burroughs "Unitized" Pulse Control Equipment, call or write Department 17, Electronic Instruments Division, Burroughs Research Center, 511 N. Broad St., Philadelphia 23, Pa.

PULSE GENERATORS
COINCIDENCE DETECTORS
PULSE DELAY CIRCUITS
FLIP-FLOP CIRCUITS
PULSE GATERS
CHANNEL SELECTORS
MIXERS

ELECTRONIC INSTRUMENTS DIVISION
Burroughs

LFE

solid delay lines stop time



Available for video integration, computers, time markers, moving target indication, etc.

LFE Solid Delay Lines offer important advantages in obtaining precise delay intervals for pulse or modulated signals:

Wide ranges of delay	Smooth pass band
Low attenuation	Wide temperature range
Low spurious response	Minimum size and weight
Wide bandwidth	Rugged construction



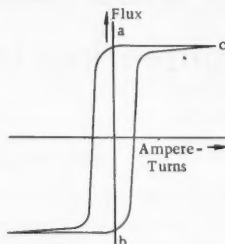
For complete information, write: SPECIALTIES DIVISION

LABORATORY for ELECTRONICS, INC.

75-9 PITTS STREET • BOSTON 14, MASS.

PUT THIS HYSTERESIS LOOP TO WORK FOR YOU!

You probably have been intrigued or are already working with the new nickel-iron alloy which has this bi-stable hysteresis curve. It makes possible pulse storage without power, pulse transfers at varying rates, pulse conversions from serial to parallel - while eliminating many vacuum tubes or mechanical devices otherwise necessary.



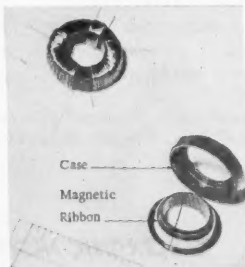
MATERIAL - a grain-oriented heat-treated alloy of nickel-iron with an extremely rectangular hysteresis loop, magnetically saturable in a given direction by application of a relatively weak magnetizing field. Once magnetized, removal of the magnetizing force leaves core in either state "a" or "b", depending on original direction of magnetization.

SIMPLIFY YOUR DESIGN PROBLEMS- USE THE STANDARD ALDEN STATIC MAGNETIC UNITS- IMMEDIATELY AVAILABLE

in high volume at low cost - Get your lab working - Send for literature and order samples of either --

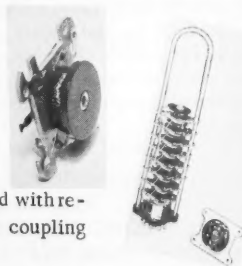
ALDEN MAGNETIC STORAGE CORES

4 Alden Magnetic Storage Cores (#725 BWA-1) containing 2-1/8 wraps of 1 mil grain-oriented, heat-treated, nickel-iron alloy, 1/8" wide - with 75, 150, and 200 turns of #36 wire. \$5.00*



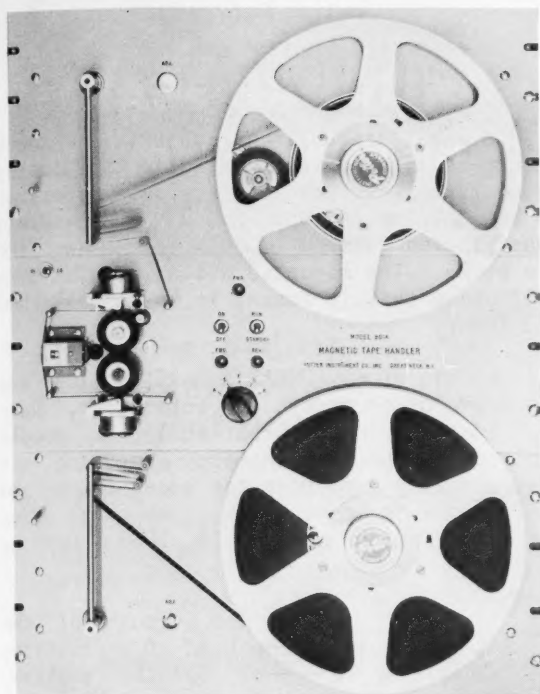
ALDEN STATIC MAGNETIC MEMORIES OR LINES

2 Alden Static Magnetic Memories (#5100RA) consisting of miniature toroidal core having 3 windings mounted on terminal card with resistor and rectifier coupling circuit. \$10.00*



*Prices in accordance with our Standard Component Proposal of 10/15/49, limited to this offer only.

ALDEN PRODUCTS COMPANY  114 N. MAIN STREET, BROCKTON MASSACHUSETTS



Announcing **Potter**
THE

DIGITAL

MAGNETIC-TAPE HANDLER

**A PRECISION RECORDER
AT A REASONABLE PRICE!**

**SPECIFY IT FOR:
START-STOP RECORDING**

DATA REDUCTION

TELEMETERING

SORTING

COLLATING

LIST PROCESSING

SPECIFICATIONS

	Model 901A	Model 901B
Tape Width	1/2"	1/4"
*No. of tracks	6	2
Reel Size	NAB Standard, 10 1/2"	
Reel Capacity	2400 ft.	
Tape Speed	Dual-speed, 15 and 30 inches/sec.	
Start & Stop Time	5 millisecond, either direction.	
Control	Manual, or remote pulses, 15 volts positive.	

*Greater number of tracks available on special order.

ASSOCIATED DATA HANDLING COMPONENTS

Complete Data Handling Systems or individual plug-in components are available. Recording and playback amplifiers, electronic counters with transfer gates, shift registers, and other associated data reduction components can be supplied for special data handling problems.

Here is a new high-speed Magnetic Tape Handler for every data recording application. Exclusive features provide maximum versatility, complete dependability, ease of operation, and simplicity of maintenance, and do it at a price thousands of dollars below anything now available.

Unique in every respect, this outstanding Potter precision instrument provides 5 millisecond start and stop, forward or reverse, from external signals. Record, playback, or compare—every desirable function can be accomplished easily.

New photo-electric proportional servo tension controls assure uniform tape tension over the recording head at all speeds. Independent reel drives, controlled by the servos, assure freedom from tape breakage or spilling.

Do you have a problem in efficient and economical data handling? Check the performance specifications in the column at the left and, for complete information on how to fit the Potter Magnetic-Tape Handler into your program, **write, now, to Dept 8N.**



107

POTTER INSTRUMENT COMPANY

INCORPORATED

115 CUTTER MILL ROAD, GREAT NECK, NEW YORK

Memorandum from
Edmund C. Berkeley and Associates
Publishers of COMPUTERS AND AUTOMATION
36 West 11 St., New York 11, N.Y.

ADVERTISING

1. What is "COMPUTERS AND AUTOMATION"? It is a magazine published monthly, except June and August, containing articles and reference information related to computing machinery, robots, automatic controllers, cybernetics, automation, etc. One important piece of reference information published is the "Roster of Organizations in the Field of Computers and Automation". The basic subscription rate is \$4.50 a year in the United States and Canada. Single copies are \$1.25. The magazine was called THE COMPUTING MACHINERY FIELD until the March issue; prior to this issue, it was published less often than ten times a year.

2. Who are the logical readers? The logical readers of COMPUTERS AND AUTOMATION are some 3000 persons who are concerned with the field of computers and automation. Many people are entering this field all the time. These include a great number of people who will make recommendations to their organizations about purchasing computing machinery and similar machinery. We have been carefully gathering the names and addresses of these people for some time and believe we can reach them. The print order for the July issue is 1300 copies. The paid subscriptions on June 15, 1953 were a little over 880.

3. What type of advertising does COMPUTERS AND AUTOMATION take? The purpose of the magazine is to be factual and to the point. For this purpose the kind of advertising wanted is the kind that answers questions factually. We recommend, for the audience that we reach, that advertising be factual, useful, interesting, understandable, and new from issue to issue. We have had a number of comments expressing satisfaction with our style of advertising.

4. What are the specifications and cost of advertising? The next issue of COMPUTERS AND AUTOMATION will be in Sept., 1953. It will be on pages 8½" by 11" and will be produced by photooffset. If possible, the company advertising should produce final copy, which should be actual size, and may include typing, writing, line drawings, printing, screened half tones, etc. — any copy that may be photooffset without further preparation. If inconvenient to produce this, we will take rough copy and arrange with the printer to prepare it; there will be small additional charges in this event. Display advertising will be sold in units of full pages (ad size 7" by 10", basic rate \$100), and horizontal half pages (ad size 7" by 5", basic rate \$55); back cover, \$180; inside back cover \$125. Classified advertising will be sold by the word (30 cents a word), with a minimum of ten words. The following discounts will apply to display advertising excluding cover space: 20% for a company with less than 50 employees and a publisher of books; 40% for a company of less than 20 employees; 2% for payment before the closing date Aug. 7 for the September issue.

5. Who are our advertisers? Our advertisers in six issues October to May have included the following companies, among others:

Alden Products Co.
Computing Devices of Canada, Limited
Consolidated Engineering Co.
Electronic Associates, Inc.
General Ceramics and Steatite Corp.
Hughes Research and Development Labs.
International Business Machines Corp.

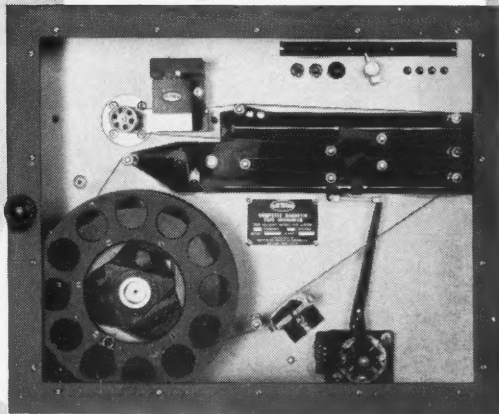
The Macmillan Co.
Magnetic Metals Co.
Monroe Calculating Machine Co.
George A. Philbrick Researches, Inc.
Reeves Instrument Co.
Remington Rand, Inc.
The Teleregister Corp.

RAYTHEON

TAPE HANDLING MECHANISMS

For Recording and Storing Digital Data

A complete assembly including reels, tape, six-channel magnetic recording head, slack absorbing mechanism, photo reading head, controls and built-in power supply. Designed for automatic operation by pulsed input signals or manual control. Panel mounted for installation in standard 19" wide radio relay rack.



Write for Bulletin DL-Y-5

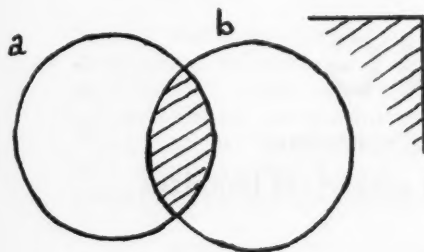
TECHNICAL SALES DEPARTMENT

RAYTHEON
MANUFACTURING COMPANY
WALTHAM, MASSACHUSETTS

OTHER BULLETINS

Binary-Octal Calculator
Magnetic Recording Heads
Magnetic Shift Register
Computing Services
Write for Them

DL-Y-1
DL-Y-2
DL-Y-3
DL-Y-4



$$a \cdot b \vee a' \cdot b' = 0$$

$$\therefore a = b'$$

SYMBOLIC LOGIC: Course SI:

Nonnumerical exact reasoning using efficient symbols for calculation. ... Has important applications in the logical design of computers and control circuits. Prereq.: Elementary algebra. Fee: \$28.

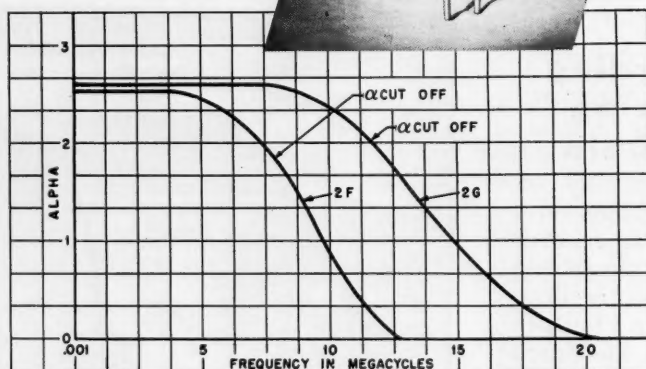
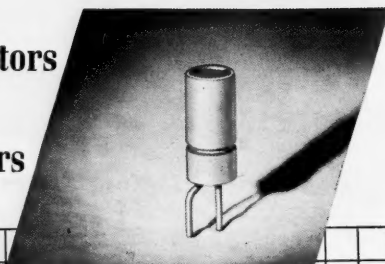
— and 25 other courses, by mail, in
COMPUTING MACHINERY, MATHEMATICS,
STATISTICS, and other subjects.

(We have students in 42 states and 13
foreign countries).

For more information, circle CA No. 65 on the reader inquiry card.

EDMUND C. BERKELEY AND ASSOCIATES, 19 Milk St., R65, Boston 9, Mass.

Point Contact Transistors for High-Speed Computers



2F SPECIFICATIONS 2G

Frequency Response—5mc. α cut off
0.15 μ sec. rise time

Frequency Response—10mc. α cut off
0.1 μ sec. rise time

Write Dept. C7 for detailed specifications



TRANSISTOR PRODUCTS, INC.
SNOW AND UNION STREETS, BOSTON 35, MASSACHUSETTS
AN OPERATING UNIT OF CLEVITE CORPORATION

Automatic Electronic Equipment for

READING

Printed or Typewritten Characters
and converting them into coded electrical impulses

INTELLIGENT MACHINES RESEARCH CORP.

134 South Wayne St., Arlington, Va. JACKSON 5-7226



MONROBOT ELECTRONIC CALCULATOR



The MONROBOT is a general purpose digital computer, compact, ruggedized, reliable and reasonably priced. In the MONROBOT, decimal numbers are used. Since twenty digits are available, with a centrally located decimal point, there is no need for scaling or setting of decimal point. Neither overflow nor translation techniques are necessary. Orders are written for the calculator in virtually their original algebraic form.

Neither highly trained personnel nor extensive training effort are needed for the MONROBOT. Keyboard and automatic tape operations are counterparts of the simple programming procedures. Average office personnel become familiar with MONROBOT operation the first day. It prints out results on 8-1/2" wide paper roll, or perforates a paper tape as desired.

MONROBOT V is complete in one desk-size unit, ready to plug in and perform. MONROBOTS can be supplied with capacities to suit special requirements, avoiding excess investment for unnecessary facilities.

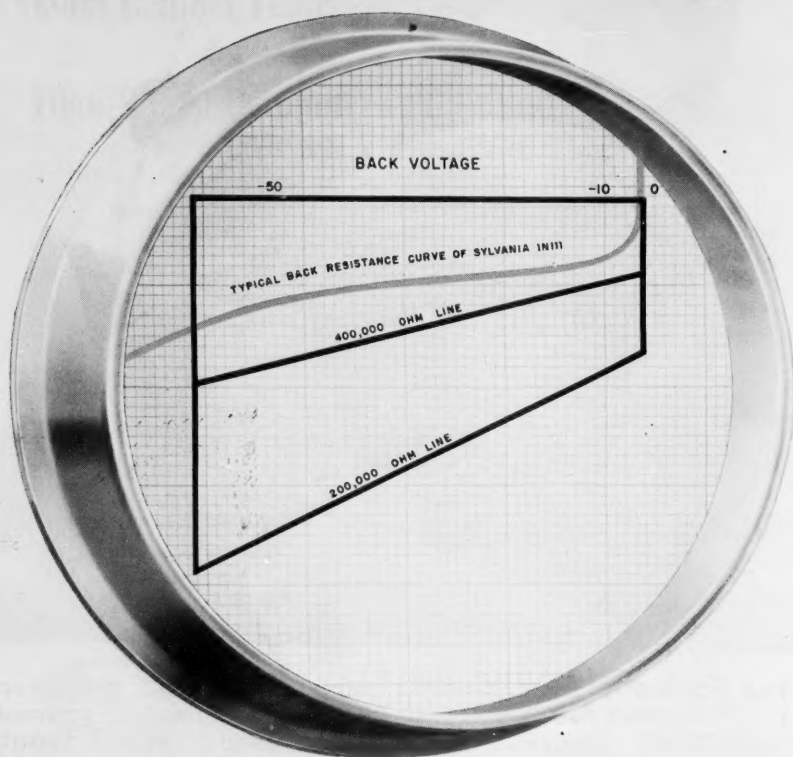
MONROBOT CORPORATION

MORRIS PLAINS

NEW JERSEY

A SUBSIDIARY OF MONROE CALCULATING MACHINE COMPANY

Sylvania Computer Crystal Diodes



1N111
1N112
1N113
1N114
1N115

All Dynamically Tested at 55° C. For High Back Resistance and Stability

Sylvania Types 1N111, 1N112, 1N113, 1N114 and 1N115 were designed specifically for computer use. All Sylvania's Computer Diodes are tested at raised temperatures simulating actual operating conditions. To insure maximum stability and life, all units are tested for

evidence of drift and hysteresis. Each diode is hermetically sealed in glass and is designed so that it may conveniently be soldered or clipped into a circuit.



Mail this coupon Today

SYLVANIA

LIGHTING • RADIO • ELECTRONICS • TELEVISION



In Canada: Sylvania Electric (Canada) Ltd., University Tower Building
St. Catherine Street, Montreal, P. Q.

Sylvania Electric Products Inc.
Dept. 3E 6207, 1740 Broadway, New York 19, N. Y.

Please send me data sheets on Sylvania Computer Crystal Diodes.

Name _____

Address _____

City _____ Zone _____ State _____

S

s
d
r
/

N. Y.
ia Com-

te.